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(22) 1997/10/24  
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(72) BROULIK, Hynek, CA

(72) CONSTANTIN, Mihai, CA

(71) NORTHERN TELECOM LIMITED, CA

(51) Int. Cl.<sup>6</sup> G06F 9/44, G06F 13/00

(54) **NOEUD GUI COMMUN TELECOM/TRANSPORT BASE SUR LE  
WEB**

(54) **WEB BASED TELECOM/TRANSPORT NODE COMMON GUI**





# *Description of the Invention*

The WEB Based GUI consists of the following:

- (1) Architecture for basic elements (servers, clients, UI engines and applications).  
The architecture is common on all Transport nodes and OPCs.  
Common architecture enables seamless communication of all transport nodes and OPCs in the Sone/Optical network.  
This architecture is achieved by applying WEB technology principles in the design, and is unique in the Telecom /Transport node fields.
- (2) Common presentation of information (look and feel) to craft persons.  
Presentation is rendered by browsers (Netscape or Explore).  
Organization of the screen and its design as far as (a) consistency, (b) speed of presentation and (c) feedback to the user - is unique in the Telecom/Transport node fields.
- (3) Design of session management to control Browser sessions and design of utilities to convert application information into the form for the Browser - the inside processing presents a set of original solutions.

The (1) Architecture enables connectivity (access) from any point of the network - brings economical and uniform solution.

The (2) common presentation solves craft person training/mobility and brings fast and modern GUI.

The (3) Session management and utilities enable context sensitive and real time information updating, thereby improving effectiveness of the craft personal.





# The Problems Solved

(1) Information presented to surveillance center and info presented to local craft person should be the same

- we need to access the Network Elements locally and as well remotely from surveillance centers
- the information presented should be exactly the same
- this is achieved by the unique architecture and one implementation only - HTML/Java script on the NE itself

Note: current industry practice is to implement client-server solution, different for local access and remote access. This is expensive and does not bring the same presentation for the surveillance centers and local craft persons (because of the underlying different technology).

2-

(2) All transport Node/OPC UI should have common look and feel

- our customers need intuitive and easy to learn UI - they need to decrease cost of operations, and cost of training their craft persons. As intuitive UI prevents human errors it is very important considerations for large network operators.
  - our customers need common UI for all our products (for above and other reasons)
  - Common UI is achieved by using WEB based Technology and unique design of our screens
- When we introduce the WUI, OC-192, OC-48 and OC12 will achieve all of above requirements

Note: Current situation - Nortel has different and not user friendly UIs. The competition does offer GUI, but not the WEB Based GUI.





## *The Problems Solved*

### (3) Context sensitive and real time information is required

- for large network operations, humane error means loss of traffic and huge economical loss, possible emergency situations. Our customers need reliable, responsive UI, easy to use to minimize possibility of human errors.

- WEB Based GUI with the unique NE session management and utilities offer such a capability

Current situation: - since all NORTEL UIs are implemented differently, there are inherent inconsistencies between different UIs on different products. If the craft persons are operating more products, they can make mistakes when moving from one to another product





## *Prior Art*

(1) Nortel Current UI is text based (VT100 based), not GUI

(2) Current industry practice, consists of client - server proprietary implementations, using Visual C++ (or Basic) and proprietary protocols. In fact this has been implemented for OC-3 in 1996.

This solutions is expensive ( needs to be repeated for every platform) . The remote access does not provide the same presentations - because of underlying different technologies.

As well it creates logistic nightmare (expensive) for version management of clients and servers. (For both supplier and user).

(3) HTTP server running on one node (outside - like Unix WS, or inside network - like OPC) and proprietary protocol between server side CGIs and UI engines on Network elements

This solution was tried in one of our early prototypes. It is common in current industry WEB based solutions. This architecture does not work for fast response time, it is slow and not reliable.

It does not work well for remote accesses (remote login requirements) - the response time is very long - not really acceptable for Transport nodes.

(4) HTTP server running on one node and providing one transaction at a time, without concept of a session. This approach is used for some network management packages or database retrieval info systems.

This is based on 'stateless' server paradigm.





# Elements and Advantages

(1) Information presented to surveillance center and info presented to local craft person should be the same

- presentation part, definition of the screens and utilities generating dynamic screens are implemented once on the node which is being accessed either locally or remotely.
- This guarantees that the same information will be presented always the same way
- from corporation point of view - the design and implementation is done only once, it does not need to be repeated on the network management node and the local node

(2) All transport Node/OPC UI should have common look and feel

- using the WEB technology, HTML, CGI, HTTP protocols, with the same GUI elements (e.g. buttons, lists, hypertext links) on all transport nodes will bring the same look and feel automatically
- substantial part of the screen definitions and utilities generating dynamic screens will be reused on all transport nodes (appr 80 %), giving us identical screens/presentations
- from the corporation point of view, this represents significant saving of design and implementation work

(3) Context sensitive and real time information is required

- context sensitivity, session management and real time updating is achieved by combination of specially designed utilities and WEB technology elements (like hypertext, push, frames, etc).
- using WEB technology elements represents economical and uniform solutions, with the possibility of future expansion (e.g. audio alarm reporting, audio commands when supported by HTTP protocol)





# Commercial Importance

Note: Commercial spec is available - we can supply if needed

(1) Our customers require uniform GUI for all Nortel products.

This invention (technology) in the only solution viable economically and technically. Without this approach and technology we would not be able to develop (design, implement and coordinate) GUIs for all products.

For our customers, uniform WEB based UI represents huge saving in training craft persons, flexible operations (the client is a browser, craft person can save UI results in files, e-mail, print, use in applications like excel available on a PC), reusing the craft persons in operations on any Nortel equipment, potentially customized UI, etc.

(2) At this time, our competitors (Fujitsu, Lucente) provide GUI on their products.

This means that our customers prefer GUIs, they experienced them and asking us to provide GUIs on our products.

However, our competitors do not have WEB based GUI, i.e. they are developing their GUI using the old client-server technology.

Using this invention, we will provide more flexible, common GUIs on all our nodes and we will reverse the current situation, i.e. we will gain competitive advantage.







## *Description of WUI*

The Following slides provide summary of presentations given to our customers during our Customer Interaction Program.

The following is presented:

- (1) Summary of tech. specifications of WUI
- (2) Major requirements
- (3) Architecture of major SW components on Transport Node (i.e. Network Element)
- (4) PC/Laptop - recommended configuratios
- (5) Outline of a local access
- (6) Outline of a remote (NE to NE) access
- (7) Outline of a remote (INM to NE) access
- (8) Screen layout - general description
- (9) Screen design samples - major screens





# WUI

## UI type:

GUI, intuitive, point and click, direct object manipulation

- context sensitive presentation
- consistent with major Nortel products OC-48 and OC-12
- targeted towards all levels of users and non frequent users
- designed with *Consistency, Speed and User Feedback*

## What is not supported

- does not support scripting (available through PC, Silktest.)
- shelf graphics
- on-line and context sensitive help
- on-line NTPs and Caps

## Planned

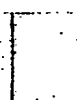
- on-line help, context sensitive help, NTPs, CAPS
- shelf graphics under consideration
- becoming main OC-192 UI





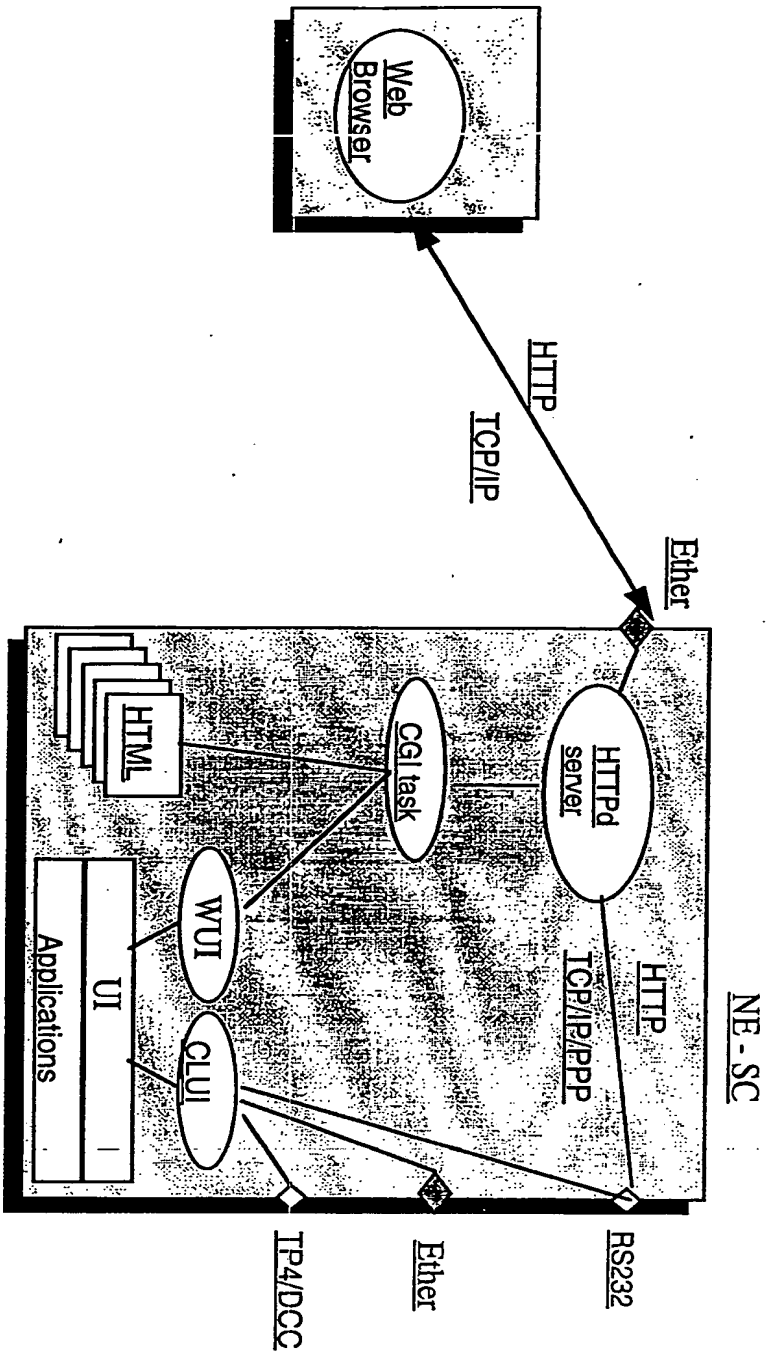
## *Requirements*

- intuitive and easy to learn to minimize training
- easy to use to prevent human errors
- context sensitive and real time info updating to speed up operations
- runs on Unix/Windows/Mac (same appearance)
- platform independent (Windows 95, Unix, etc)
- network user interface
  - must support NE-NE remote login
  - must support reach-thru from INM
- client and server software releases must not be "bundled"
- four sessions either locally or remotely





# OC-192 WUI Architecture



- (1) Off the shelf WEB browser on PC/Mac/Unix WS
- (2) Extensive connectivity via TCP/IP and RS232/PPP

Note: For more description see Notes





# PC configuration

	IE4	IE3	N4	N3
CPU	486/66	386DX	486	386SX
MEM	8	8	16	8
HDD	50	10	16	10

IE=Microsoft Internet Explorer, N=Netscape Navigator

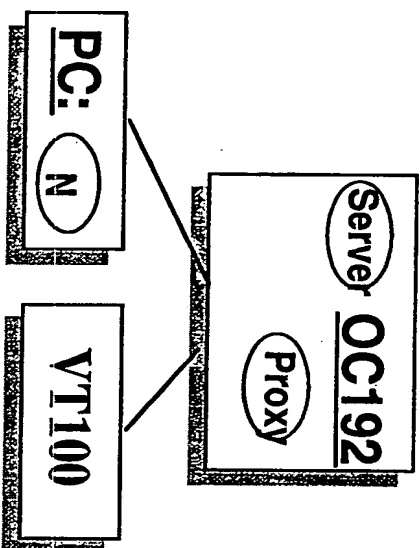
MEM in MB

HDD in MB





# WUI local access



-12-

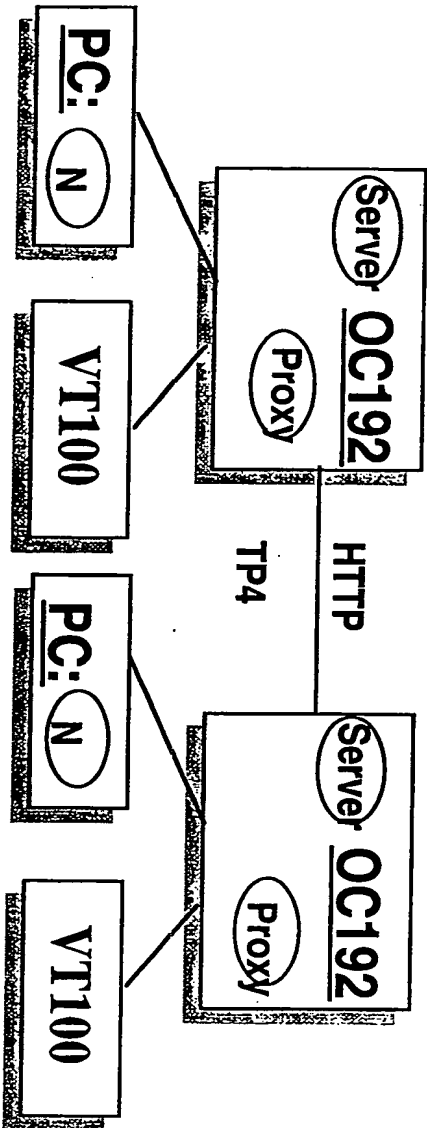
MI Ethernet	LCAP RS232 port
MI RS232 port	MI RS232 port

MI RS232 port configurable as CLUI or WUI (direct or via modem)



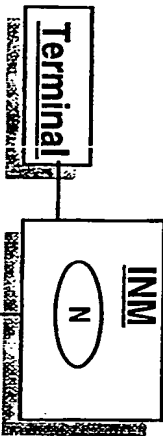


# WUI NE-NE login





# WUI INM reach-thru



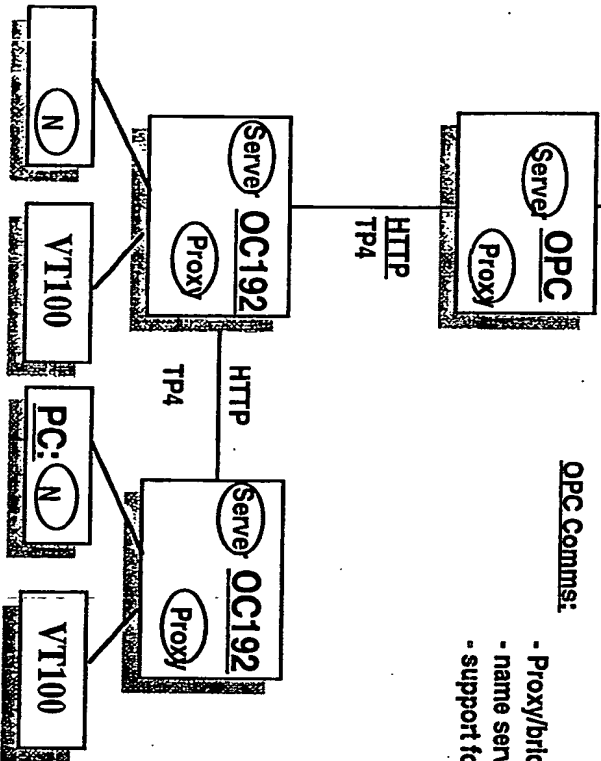
INM: - to spawn Netscape session to reach-thru NES

Security: covers User Administration and Access

## OPC Comms:

- Proxy/bridger
- name server (addressing)
- support for INM reach through

-14-



## NES: - HTTP server

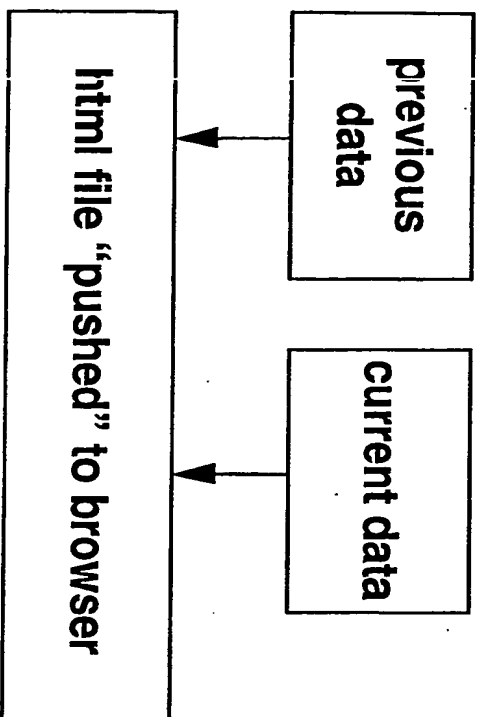
- UI interface to Server
- HTML files (screens)





## *Dynamic screens*

- Network/local banner line screens
- Performance monitoring screens
- Protection switching screen
- Implemented as server push





# Dynamic screen example

NetScape - [OC192 Browser User Interface]

Home | Back | Forward | Stop | Reload | Print | Find | Help

Name: Ottawa | ID: 9689 | Location: NEND | Major: 10 | Minor: 0 | Version: 0 | Date: 06/05/1997 | Time: 08:44

Display counts

Location: NEND	15-minute		1-day	
	current	last	current	last
Sect CV	0	0	0	0
Sect ES	0	0	0	0
Sect SES	0	0	0	0
Sect SEFS	0	0	0	0
Line CV	0	0	0	0
Line ES	0	0	0	0
Line SES	0	0	0	0
Line UAS	0	0	0	0
Line FEC	0	0	0	0

Alarms: Log Browser, Ptd Mon, Protection, Equipment, Ejector, Pivoad, Administration, Logout, Help

Display Counts: Query Thresholds, Enable All Threshold Reporting, Display History Counts, Edit Threshold 1, Disable All Threshold Reporting, Clear Counts, Edit Threshold 2

OC192 G1 | Help | Exit





## *Context sensitivity*

- two menu sets for commissioned/uncommissioned NE
- only options applicable to a command presented
- commands tailored to user privileges





NCSA Mosaic - Netscape - [OC192 Browser User Interface]																																																																									
File		Edit		Format		View		Help																																																																	
Open	Save	Print	Cut	Paste	Copy	Find	Back	Forward	Home																																																																
Stop	Reload	Quit																																																																							
<p>Location: OC192 Browser User Interface</p> <p>Status Bar: Critical Value: Minor Warning: Major Warning: Fatal Error: 0 0 0 0 06/05/1997 08:44</p>																																																																									
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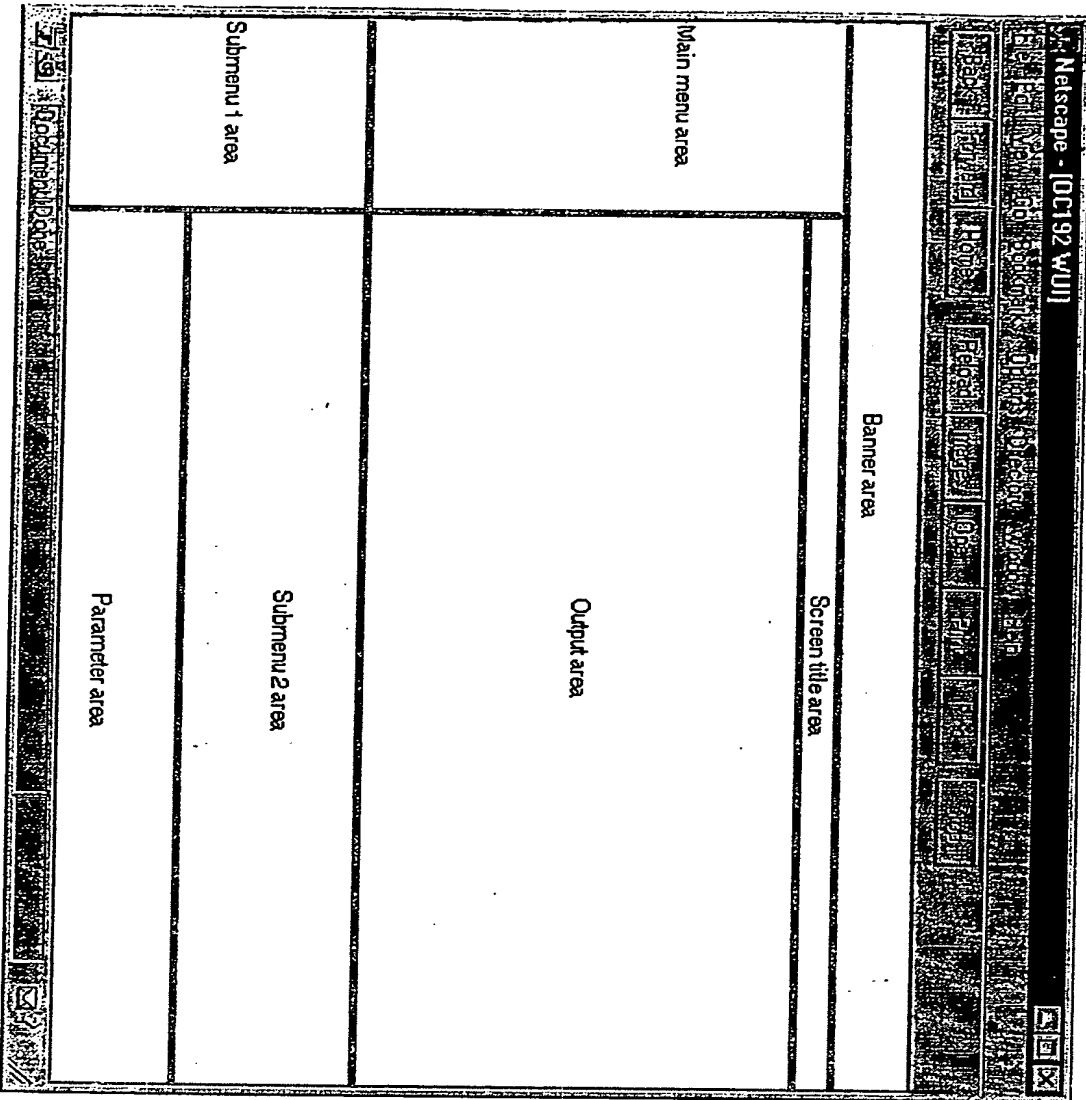
## *GUI building blocks*

- no pictures used - DCC bandwidth saved
- HTML hypertext, links, buttons, forms, tables  
minimal Java, only JavaScript
- consistent navigation accross all screens
- consistent data presentation
- output can be saved, printed from browser
- no shelf graphics in first implementation





# Screen Layout





NetScape - OC192 Browser User Interface

Back Forward Home Reload Stop Open Location Print

Name: Ottawa ID: 9689

10 0 0 06/05/1997 08:44

Alarms

Log Browser

Per Mon

Protection\*

Equipment

Facility\*

Payload\*

Administration\*

Logout

Help\*

All

3 Eqp 1 CE	Unknown software release	M,nsa
26 Eqp 2 OC192 G2	Rx circuit pack missing	M,nsa
25 Eqp 2 OC192 G2	Dx circuit pack missing	M,nsa
24 Eqp 2 OC192 G2	Tx circuit pack missing	M,nsa
23 Eqp 2 SWITCH B	Circuit pack missing	M,nsa
22 Eqp 2 SWITCH A	Circuit pack missing	M,nsa
21 Eqp 2 OC192 G1	Tx circuit pack missing	M,nsa
20 Eqp 2 OC192 G1	Dx circuit pack missing	M,nsa
19 Eqp 2 OC192 G1	Rx circuit pack missing	M,nsa
18 Eqp 1 ESI	G2 Circuit pack missing	M,nsa

17 Eqp 1 ESI

Active

History

All

Equipment

Critical

Environment

Major

Facility

Minor

Warning



NetScape - [OC-192 Browser User Interface]

Back Forward Home Reload Print

Name: [Chava] ID: [5689] [10] [0] [0] [06/05/1997] [08:44]

Alarms

By Log Type	Alarm	Time	Count	Description
Log Browser	ALM300	00-00-00	0	Facility alarm
Perf Men	ALM301	01-01-95	00:03:51	22 Reference protection user request
Protection	ALM305	00-00-00	00:00:00	0 Protection switch complete
Equipment	ALM310	01-01-95	00:03:53	316 Equipment alarm
Facility	ALM311	00-00-00	00:00:00	0 CPG equipment alarm
Payload	ALM312	01-01-95	00:00:23	26 Common equipment alarm
Administration	ALM313	00-00-00	00:00:00	0 Equipment intercard alarm
Logout	ALM314	00-00-00	00:00:00	0 Common equipment slot alarm
Help	ALM315	00-00-00	00:00:00	0 Shelf equipment alarm
	ALM320	00-00-00	00:00:00	0 Environmental alarm
	ALM330	00-00-00	00:00:00	0 Payload alarm
	ALM340	00-00-00	00:00:00	0 Telemetry alarm
	ALM350	00-00-00	00:00:00	0 PH threshold crossing alarm

Summary Reports

By Log Type

Alm	Alp	Alt	Coml	Env	Eqp	Eag	Fwdh	Ne	Pm	Scud	Secu
-----	-----	-----	------	-----	-----	-----	------	----	----	------	------







Netescape - [OC192 Browser User Interface]

File Edit View Options Help

Back Forward Home Stop Reload

Name: ID: 9689

Address: 10.0.0.0

0 0 06/05/1997 08:44

Alarms

Log Browser

Ref Mon

Protection\*

Equipment

Fielding\*

Download\*

Administration\*

Logout

Help\*

Inventory

Sh Slot	Type	Equip ID	PEC	Actual	PEC	Vintage	Serial
1 1	BREAKER	0	NTCA40AA	NTCA40AA	000	0	
1 2	BREAKER	0	NTCA40AA	NTCA40AA	000	0	
1 6	SC	SNCIPSOBAA	NTCA41**	NTCA41BA	050	01W1A221	
1 7	EST Unit	SNSIEOBAA	NTCA44**	NTCA44AA	040	B1891F38	
1 8	EST Unit	SNSIEOBAA	NTCA44**	NTCA44AA	040	B169222A	
1 9	Main IF	SNSIEOBAA	NTCA42**	NTCA42AA	070	B1392229	
1 10	MX	SNSIEOBAA	NTCA48**	NTCA48AA	080	B1991A0C	
1 13	PT	SNSIEOBAA	NTCA45**	NTCA45AA	020	B159330	
2 1	FILLER1	-	NTCA49AA	-	-	-	
2 2	FILLER3	-	NTCA49AC	-	-	-	
2 2	FILLER3	-	NTCA49AC	-	-	-	
2 2	FILLER3	-	NTCA49AC	-	-	-	

Inventory

Create\* Query NE\* Edit NE\* Edit SH Position\* Edit Clock Source\*

Query NE AP\* Edit NE AP\* Query SH AP\* Edit NE AP\* Add MAA\* Query MAA\* Delete MAA\*

Released\* Led Test\*



Netcape - [Oct 192 WUI]

Back Forward Reload Home Stop Log Off

Home Office Mail News Weather Local Area

Ottawa 9589 10 0 0 06/05/1997 08:44

Query

Alarms  
Log Browser  
Perf Mon  
Protection  
Equipment  
Facility  
Payload  
Administration  
Logout  
Help

Optical  
Timing In  
Timing Out  
DCC  
MOR Signal  
MOR Oscillator  
MOR Power

Query Edit Change State Query AP Edit AP

OC192 G0 [X] [E] [O] [P] [A] [R] [T] [E] [R] [S]

Document: Done



Netescape - [OC192 WUI]

File Edit View Options Document Window Help

Back Forward Reload Images Open Print Home Stop

Address: Ottawa 9889

City: Ottawa Province: Ontario Country: Canada

Latitude: 45.4211 Longitude: -75.6972

Altitude: 100 Feet

Time: 08:05/1997

Daylight Savings: 08:44

Alarms Log Browser Perf Mon Protection Equipment Facility Payload Administration Logout Help

Query Edit QueryAP EditAP



Netescape - [OC192 WUI]

Back

Forward

Home

Reload

Images

Open

Print

Send

Stop

Name

Id

Critical

Major

Minor

Version

Build

Adp

Pro

Ver

Date

Time

08/06/1997

08:44

Alarms

Log Browser

Perf Mon

Protection

Equipment

Facility

Payload

Administration

Logout

Help

List Log Summary

Query Log Records

Date and Time

User Admin

Telemetry In

Telemetry Out

Ethernet

Query

Edit Date and Time

Edit Time Zone

WHAT IS CLAIMED IS:

1. A network processor comprising:
  - 5 a hypertext protocol server;
  - a plurality of hypertext files;
  - a web user interface;
  - a task for coupling the web user interface and the plurality of hypertext files to the hypertext-protocol
  - 10 server and an interface for interfacing the web user interface to a user interface and application for monitoring the network processor.